meteor was indicated by a mellow luminous tinge which appeared through the openings of the clouds in the north.

About half-past eight a similar luminous glow was observed through the clouds which were fast disappearing in a heavy dew. This light appeared like a belt of 2° broad, extending across the sky from a point almost due east directly to the west, and reaching within 5° or 6° of the horizon. As the clouds disappeared, which they did very rapidly, the true character of the aurora became more perfectly developed. In the north the usual dark arch from which the columns of light ordinarily appear to issue, was for the greater part of the time wanting; and the luminous columns seemed to rise from the earth, extending upwards occasionally to the pole star, beyond which no trace of them was visible. A brown vapoury cloud, the only one now visible, extended along the horizon from N.N.E. to a few points south of east, and maintained apparently a motionless position, the lower part appearing to rest upon the earth, and the upper edges, which seemed uniform, rose about 6° above the horizon. Immediately in the east, and apparently issuing from this cloud, rose the belt or zone of light already noticed, forming a magnificent arch. The light emitted from this zone was of a milky whiteness, and the matter of it seemed to be much more compact than any portion of an aurora ever seen by the author; but immediately in the zenith, where it intersected the Milky Way, it appeared to be far less compact. At this point, where alone motion was observable, a constant current was seen, presenting the appearance of light fleecy clouds driven by a strong wind, and following each other in such close succession as to appear in contact. This stream of the aurora was maintained undiminished for more than an hour, during which time the eastern part of the zone did not appear to lose either in volume or brilliancy, nor did the western seem to gain in either of these respects. After an hour, the dark cloud seemed to diminish slowly, and with it the zone began to lose its brilliancy. In about another hour this cloud and also the zone, which throughout had maintained apparent contact with it, vanished. The conclusion, that the dark cloud served the purpose of a conductor and fed the zone drawing off the matter of the aurora from the north, seemed to the author inevitable. The cloud did not appear to him to be more than forty or fifty miles distant. In conclusion he remarks that none of the prismatic tints were observable on this occasion.

2. "On the Development of the Retina and Optic Nerve, and of the Membranous Labyrinth and Auditory Nerve." By Henry Gray, Esq., M.R.C.S. Communicated by William Bowman, Esq., F.R.S., &c.

The author has divided the observations contained in this paper into two parts:—the first of which treats of "The Development of the Retina and Optic Nerve; the second, of the Development of the Membranous Labyrinth and Auditory Nerve."

In the observations on the development of the retina, which have

been made on the embryo of the chick, the author demonstrates its mode of evolution, and also the mode of development of the various layers of which this membrane is formed. They commence at the early period of the thirty-third hour of incubation, at which time the cephalic extremity of the embryo presents a slight protrusion of its walls, which by the thirty-sixth hour is very considerably increased, having become more elongated and protruded outwards, presenting a somewhat dilated end, and being somewhat constricted at its connection with the anterior cerebral cell from which it arises. This is the first indication of the development of this membrane.

At the forty-sixth hour this protrusion (which the author calls the optic vesicle) was still more distinct, and the cavity in the cerebral cell, from the wall of which it arises, was well seen, and it was observed to communicate with the cavity of the optic vesicle which was also hollow. This description of the mode of development of the retina the author considers as confirmatory of the observations made by Baër, but not in accordance with that given by Wagner or Huschke.

The author then proceeds to detail very minutely the consecutive stages of the development of the retina and parts in immediate connection with it, until the seventh day, when he states that on making a section of the eye, it was separated from the other tunics as a perfectly distinct layer. The optic nerves were also now completely formed, being united to form the chiasma, and passed inwards in the direction of the under surface of the corpora quadrigemina.

The author in the next place proceeds to consider the development of the various layers of the retinal membrane, a point which appears not to have been previously noticed by any physiologist. This membrane on the eighth day of incubation can be seen, by the naked eye, distinct from the other tunics. Its choroidal surface is composed of a mass of globular nuclei about the size of the red corpuscles of the blood, which form at this period about one-half the entire thickness of the retina, the deeper surface consisting of some fine granular matter and a mass of pale and delicate nucleated cells similar to those found surrounding the fibrous lamina in the normal structure of the membrane.

The "Membrana Jacobi" is first observed on the thirteenth day as a fine pale granular stratum which covers in the globular nuclei already described. In this, at about the fifteenth day, some brilliant yellowish granules are imbedded; they vary in size from the 5000th to the 8000th of an inch, and around them a delicate cell-wall is traced; they soon acquire an oval shape; then become more elongated; and about the eighteenth day the almost perfect rods are formed. They are now disposed in an imbricated manner, and their nuclei, which are of a bright yellow colour, are placed generally at the apex, but sometimes in the middle of the rods. On the twenty-first day this membrane is similar to what is seen in the full-grown bird.

The first trace of the "fibrous lamina" is seen between the fourteenth and fifteenth days, as a fine pale granular lamina marked by

numerous faint longitudinal striæ. On the eighteenth day this membrane when separated from the other layers is seen composed of numerous fibrillated meshes, in which are deposited the nucleated vesicles which are formed as early as the eighth day. From these observations it is seen that the retina is formed as a protrusion from the most anterior cerebral cell, being hollow and communicating with its cavity; that it subsequently assumes a pyriform shape, presenting a dilated end, the future retina, and a tubular portion, the optic nerve. As the tubular portion becomes solidified so as to form the optic nerve, then no communication can be traced between the optic vesicle and the cavity from which it is an offset. By degrees the spherical end of the protrusion is absorbed, and the retina, being now fully formed, becomes attached to the margin of the lens. The optic nerve is then traced to be connected not only with the anterior cerebral cell, but, uniting with its fellow at the under surface of the optic lobes, is seen partly to terminate in those bodies. The deductions from these observations may be thus briefly stated:—

1st. They confirm the observations on the structure of the retina made by Bowman, who has shown that the essential part of this membrane is analogous to the cineritious matter of the brain, and is composed like it of a fibrous mesh intermingled with vesicles of grey matter, being, in fact, a portion of the cerebrum pushed outwards and connected with the brain by its appropriate commissure, the optic nerve. The mode of development of this membrane would show this to be the correct view of the structure of this essential part of the retinal expansion, and at the same time disprove the statements of Henle, who believed it to be more analogous to epithelium.

2nd. The origin of the optic vesicle from the anterior cerebral cell, would show the incorrectness of the opinion of those anatomists who have stated that none of the fibres of the optic nerve could be traced to the optic thalami. The thalami being developed from the same centre from whence these vesicles arise, would render it exceedingly probable that the optic nerves had some connection with those bodies.

The second part of the paper describes the development of the membranous labyrinth and auditory nerve.

The essential part of the auditory apparatus, viz. the membranous labyrinth, consists, like the retina, of a membranous lamina formed of the terminal axes cylinders of the nerve tubules in intimate connection with a layer of closely-set nucleated cells; like it also, it may be regarded as a portion of the brain protruded outwards, and connected with an appropriate apparatus which receives and transmits its peculiar impressions; its mode of development also shows a striking analogy between it and the retinal expansion.

At the fiftieth hour of incubation, there is seen on either side of the medulla oblongata, (which is not closed in above and presents an open shallow cavity,) the first rudiment of the auditory sac, in the form of a small circular-shaped protruded vesicle, communicating with the ventricular cavity from the lateral wall of which it

is an offset. The vesicle was hollow, clear and pellucid, and of a flattened circular form. At the fifty-sixth hour it had increased in size and presented a pear-shaped figure; so that now the narrow contracted tubular portion appeared the first stage in the development of the auditory nerve; the dilated portion, the auditory sac or rudimentary vestibule; and the cavity still existing in its interior and communicating with the ventricular cavity from which it arises, by means of the tubular prolongation, the auditory nerve. The aperture of communication soon becomes smaller and more contracted, and this increases as the separation between the auditory vesicle and its parent-cell takes place. At the sixty-fifth hour, besides a great increase in the size of the ear-bulb, the auditory nerve has become more distinctly formed, and is quite solidified, so that no communication can now be traced between the ventricular cavity and the vestibular sac. It is in this stage of the development of the auditory apparatus that a great similarity is to be observed between it and the normal condition of the same part in some of the lower animals. There are, in fact, now formed the two elementary portions of the auditory apparatus, the auditory nerve and the simple vestibular sac. Such is the simple condition of the organ in the Crustacea and Cephalopod Mollusks. At the seventy-second hour, the vestibular sac has lost its oval form and presents a contraction around its entire circumference. This is the first indication of the separation of the vestibule from the membranous semicircular canals which are ultimately formed from the terminal portion of the vesicle.

The minute examination of the development of these structures, of which a consecutive detail is given, leads the author to remark on the almost precise similarity in structure of the membranous labyrinth to the retina in its various stages of development, for it consists like it of a delicate fibrous mesh in the areolæ of which is deposited granular matter and numerous nucleated cells, its outer surface being composed of globular-shaped nuclei arranged similar to those covering the outer surface of the retina at an early period of its development.

From this description a marked similarity may be observed between the origin of this membrane and that of the retina. In both cases they arise as a protruded portion of the cerebral mass, being hollow and communicating with the cavity of the parent-cell. In process of time, a gradual separation takes place between them and the parts from whence they arise. They then assume a pyriform shape, but still communicate with the cerebral cavity. As, however, the nerves become solidified and the separation between them is more fully effected, then no communication can be traced between the two cavities.

3. "Tide Researches. Fourteenth Series. On the Results of continued Tide Observations at several places on the British Coasts." By the Rev. W. Whewell, D.D., F.R.S. &c.

Tide observations made at several different parts of the British